

## Appendix.

Observe the forms of the leaves of several plants. Note the veins. Is there a midrib, or are the veins parallel? Note the upper and under surfaces. How are the leaves placed on the plant?

Examine various buds. Note the bud-scales. Watch the growth of the buds; how do they grow? (By lengthening the distance between successive leaves.) Note the "eyes" of the potato; plant several "sets" of potatoes; also slips of geranium, heliotrope, leaf of begonia, &c.; likewise crocus-bulbs, iris, &c. Watch their growth. Note the rootlets, root-hairs, &c.

Rear various plants, those named above or others; place some of them in the school windows. Turn the pots round from time to time; do any of the leaves or stems turn round towards the light? Put some plants in a dark place, and others in the light; after a few days note the differences.

Take several young plants or seedlings—sow-thistle, oat, wheat, carrot, bean. Note the kinds of roots. Is there one main root, or are there several fibrous roots?

Note parts of flowers, several kinds of flowers; leaves, their veins, &c.; fruits; seeds and seed-vessels.

Take young saplings of oak or other trees. Cut the stem horizontally and vertically. Note inner and outer bark; sap-wood, heart-wood, and in some cases the pith.

Identify the chief wild plants found in the neighbourhood, including the chief weeds; the chief plants in cultivation in the district, including grasses; also the chief forest and orchard trees. Remark where possible their roots, buds, branches, flowers, fruit, seeds, &c.

Let the children keep diaries of phenomena within their observation: the date of sowing of various crops, of the appearance of the wheat, &c., above the ground; the dates of the appearance of buds of various kinds on trees.

Note the yield of various kinds of crops. Grow different varieties of wheat in different soils. Try varieties of other farm plants. Grow specimens of different grasses, &c. Note length of time from sowing to the various stages of the growth up to seeding.

Pour some water on dry sand hollowed out into a cup-shape; pour some water in like manner upon dry clay, then upon clay that has become saturated with moisture.

Take some garden-soil which has been dried as before. Crush it carefully, and sift it through muslin. Note what is left in the muslin. (Small stones and pieces of vegetable-stems.) Wash the sifted soil with pure water, pouring off the muddy water carefully into a bucket, after allowing the remainder to settle. Wash again and again until clear water only comes off. Examine what is left behind, and what has settled in the vessel into which the muddy water has been poured. (Clay.) What is left behind in the other vessels? (Sand.) What does the garden-soil contain?

Repeat the experiments with the subsoil.

Take some garden-soil; weigh it. Dry it by placing the vessel containing it in a vessel with water in it, and keeping the latter for some time at the boiling-point. Weigh it from time to time until it ceases to lose weight. How much water has been driven off? Take the dry soil; wash it well with pure water, and pour the latter off carefully so that the water poured off is quite clear. Dry the soil again. Has it lost weight? Why?

Collect and examine various insects, including the grubs, chrysalides, and the full-grown insects. Rear a few moths in boxes, noting the stages of development. Note the plants on which the grubs or caterpillars are found or feed. Note as far as you can the habits and the life-history of the various insects. Are they noxious or not? Do birds feed upon them; if so, what birds?

Use a thermometer to find the temperature of the air, of warm water, of the surface of the ground. Add half a pint of cold water to half a pint of warm water, observing the temperatures before and after mixing. Find the temperature of the steam over boiling water, and also that of a mixture of ice and water. Take readings of the thermometer twice or three times daily in the shade and in the sun, and, if possible, maximum and minimum readings.

There should be a few simple experiments to show the constitution of air, production of oxygen, burning charcoal in oxygen, testing product with lime-water, &c.; "soda-water"; coal-gas; ammonia, its solubility in water, &c.; composition of water; iron and iron-rust; the distinction between mixtures and chemical compounds; acids and alkalies, effect on litmus, on violet flower; comparative density of liquids; use of hydrometer and lactometer; solutions; emulsions; &c.